Galton's Centenary.

Francis Galton, 1822–1922: A Centenary Appreciation. By Karl Pearson. (Department of Applied Statistics, University College, London. Questions of the Day and of the Fray, No. 11.) Pp. 23. (London: Cambridge University Press, 1922.) 2*s.* net.

PROF. KARL PEARSON does not think that this generation is likely to do justice to the part Sir Francis Galton played in the spread of human knowledge and in its application to the future of the human race. His own appreciation he would have others share, and he whips them with scorpions as an inducement. As he says, "the time is hardly suited to impressing on the majority of men a conviction of the futility of most of their aims, of the depths of their ignorance of what makes for progress, and of the unsatisfying nature of their present pleasures."

The welcome appreciation begins with an account of Victorian science, the science of Darwin, Lyell, Hooker, Faraday, and other giants, which, he says, little men belittle—for it is impossible to appreciate Galton unless we bear in mind that he was the product of the Victorian epoch. Endowed with a fine inheritance, Francis Galton had the advantage of broad training and wide experience, very different from the early specialisation of to-day; "he had far more mathematics and physics than nine biologists out of ten, and more biology than nineteen mathematicians out of twenty, and more acquaintance with diseases and anomalies than forty-nine out of fifty biologists and mathematicians together." Darwin awoke him from "the torpor of tribal dogmas," and turned his widely interested mind to the problems of evolution. Along both observational and experimental lines, he began to study sweet-peas, moths, and man. "In his notebook on the sweet-pea experiments occur the first correlation table, the first regression curve, and the first numerical measure of the intensity of heredity, *i.e.* that between mother and daughter plant." From Mendel's peas has arisen the greater part of modern genetics; from Galton's there sprang the correlational calculus, solidly founded in "Natural Inheritance" published in 1889.

Darwin had suggested, contrary to his usual method of keeping to observed facts, the hypothesis of "pangenesis," that hereditary particles or gemmules given off from the various structures of the body are concentrated in the reproductive cells, and influence the development of these into new individuals. Galton suggested an experimental test, transfusing the blood of different kinds of rabbits to see if the offspring were influenced. The results showed that the transfusion had no effect on the offspring, and Galton tacitly discarded pangenesis. But continued reflection led him, as it also led Weismann, to the idea of germinal continuity. We believe that the idea of parent and child being successive representatives of the same "stirp" or germ-plasm had occurred, more or less clearly, to two or three other biologists before either Galton or Weismann; but Prof. Karl Pearson seems to find something "little" in directing attention to historical anticipations. There is no doubt, however, that "Galton's idea of the 'stirp,' better known under the name given to it by its later German propounder [we should say, 'independent discoverer'], the 'continuity of the germ-plasm,' has played a very large part in modern theories of heredity." It has indeed enabled biologists to understand for the first time clearly why like *must* tend to beget like.

From the fundamental idea of germinal continuity there arose in Galton's mind two broad principles, (1) that bodily modifications, or "acquired characters" in the technical sense, are not likely to be transmitted; and (2) that the differences in the characters of the offspring produced by a difference of stirp are immensely more important than those which can be produced by differences of environment. From his study of identical and non-identical twins he concluded that "nature" is indefinitely stronger than "nurture." We confess to sympathy with what Prof. Pearson calls the platitude that "nature" and "nurture" are inseparably correlated as two essential components of one resultant. Moreover, we feel sure that Galton was naturalist enough to know that improvements in "nurture" may determine the meshes of the sieve in relation to which germinal fluctuations and mutations—better and worse changes in "nature"—are sifted.

It is plain, however, that pondering over the relative evolutionary values of "nature" and "nurture" led Galton to the question which dominated the rest of his life: what evolution may mean for man. What Pasteur was along one line, Galton was along another, a pioneer in the biological control of life. Can man's constitution—in modern phraseology, his gametic composition—be improved, by mating best with best, and fit with fit, and by refraining from sowing tares with wheat? Or may we hope to effect some progress by amelioration of "nurture"—environmental, nutritional, and functional? For improved "nurture" may prompt, for all we know, progressive germinal variations; may determine the survival or elimination of variations; may, in viviparous organisms, count for much in the ante-natal life; and may, in mankind, have an almost hereditary influence on the amelioration of the social *milieu*. Galton's view was that the improvement of the human *breed* was the promiseful line

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of evolution, but we cannot think of him as failing to appreciate the manifoldness and the subtlety of nurtural influences, both on the individual and on the race.

Prof. Pearson gives us in his masterly appreciation a useful tonic. "The laws of evolution are open to our study, let us once understand them, and man can elevate man as he has developed his domestic animals—such was the gospel of Galton." Here we are all agreed, Galton was a great man of science and also a social reformer; and it is a satisfaction to all men of goodwill that he continues to live with such vigour in the Laboratory which he founded. The appreciation has as its frontispiece a beautiful sketch of Sir Francis Galton in 1910, in his "still unexhausted exuberant youth."

Modern Dietetics.

Vitamins and the Choice of Food. By Violet G. Plimmer and Prof. R. H. A. Plimmer. Pp. xii + 164. (London· Longmans, Green and Co., 1922.) 7*s*. 6*d*. net.

THE old view that a diet was satisfactory, provided that it contained a certain amount of protein and had a sufficient calorie value, has, as is now well known, been modified in two very essential particulars. The quality of the protein is of the first importance; it must supply the particular amino-acids required by the consumer, and must supply them in the proper amount. Further, there must be present the vitamins, the exact nature and function of which are still unknown, but which are essential for growth and health.

It is to these two aspects of the subject that the present work is chiefly devoted, the authors having set themselves the task of producing an account suitable for the general reader. In this they have been on the whole successful, although occasionally the superabundance of facts renders the matter difficult of assimilation. After an introduction dealing with the general principles of dietetics, the subject of the vitamins and their discovery is developed on orthodox lines. The important question of quality of protein, led up to and illustrated by an account of pellagra, is then treated, and the book concludes with two very interesting chapters on the effect of partial deficiencies in the food and errors in selection of food. In an appendix are given a table of distribution of the vitamins in food-stuffs and lists of food-stuffs rich in each of the three vitamins, followed by a very useful series of notes on food-stuffs, from which a good idea of the efficiency of a diet can be easily and rapidly obtained. The book is well produced and contains a number of interesting illustrations.

It is an inevitable consequence of the rapid progress which is being made in this branch of dietetics that the position with respect to some of the matters dealt with has changed considerably since the book was printed. This is notably the case with regard to rickets, the very recent work of McCollum and of Korenchevsky on experimental rickets in rats, and the remarkable discovery of the preventive and healing effect of sunlight on this disease, having come too late for inclusion. Similarly, the large part played by atmospheric oxidation in the inactivation of the antiscorbutic vitamin is not made clear.

The gospel preached by the authors is the orthodox one that safety is to be found in fresh natural food-stuffs, and it is wisely pointed out that instinct, often believed to be a guide to the choice of food, is no longer so under the conditions of modern civilisation. White bread, for example, almost universally preferred in this country, is far inferior in vitaminic potency to whole-meal or "germ" bread, and no instinctive need is felt for green vegetables and salads. The choice of food must be guided by knowledge, and it is pointed out that the distribution of food within the family is often conducted on quite erroneous principles.

> "Children are supposed to be sufficiently nourished if they have bread and jam and plenty of puddings with little meat or butter. It is unfortunately the custom to give to the father or wage-earner the best food, whereas his requirements for heavy manual work are actually better satisfied by the high energy value of bread, jam, and margarine. The child needs the wherewithal to grow, that is protein and vitamins in addition to calories."

It is in the provision of fresh vegetables to supplement the staple diet of bread, margarine, and meat, all very poor in vitamins, that the chief value of the allotment movement lies (as pointed out by Drummond), and it is to be hoped that the great extension of this system which was called forth by the necessities of the war will be maintained and still further increased in the scarcely less strenuous times of peace.

Even natural food-stuffs, however, are by no means constant in their content of vitamins. Little is known as yet of the cause of the variations in vegetable products at different periods of growth and under diverse conditions, but that wide variations occur has been definitely proved. In products derived from animals this variation is still more marked, and the authors rightly lay stress on this fact, pointing out that the potency of materials such as animal fats, and above all milk, depends upon the diet of the animal from which it is derived.

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